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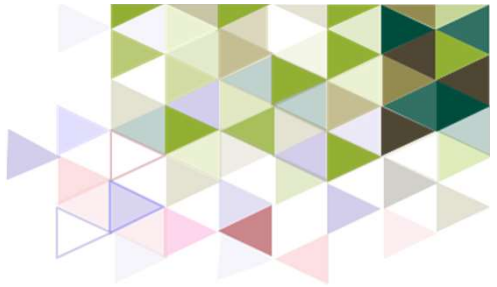
Development



SIDT
SOCIAL INNOVATION & DIGITAL TRANSFORMATION

Unit 3 – Introduction to Innovation Research

Prof. Dr. Britta M. Gossel

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Unit 3 – Introduction to Innovation Research

1. Introduction: What is innovation?
2. Innovation: Origin story
3. Genesis of innovation theories

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1. What is innovation?

Which terms do you associate with „innovation“?

pingo.coactum.de → 189840

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1. What is innovation?

- Word cloud based on 50 different definitions of innovation
- The bigger the words, the more often they were included
- Most relevant aspects:
  - new
  - process
  - product
  - value
  - idea

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1. What is innovation?

- Innovation (from lat. ‘innovare’=renew)
- An ***innovation*** is a particular novelty. The prefix “in” indicates that a new item does not just somehow occur but is deliberately introduced “in-to” the world.
- The first definition of innovation was coined by **Joseph Schumpeter** in the late 1920s, who **stressed the novelty aspect**: innovation is reflected in novel outputs: a new good or a new quality of a good; a new method of production; a new market; a new source of supply; or a new organizational structure, which can be summarized as **‘doing things differently**’.
- However, “it is practically **impossible to do things identically**”, which makes **any change** an innovation by definition (Hansen & Wakonen, 1997, p. 350)
- We also owe to Schumpeter a much cited distinction between invention and innovation: While invention is an act of intellectual creativity, innovation is an economic decision: a firm applying an invention or adopting invention.
- “Innovation = Invention + Exploitation” (Roberts, 1988, p. 13)

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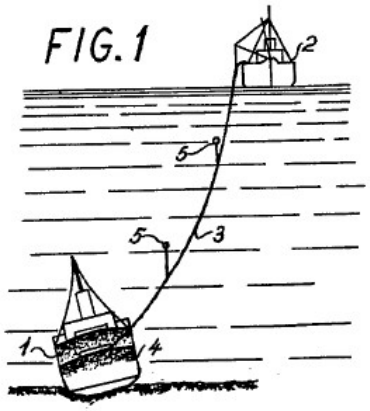
1. What is innovation?



The "Donald Duck as prior art" case

- On September 14, 1964, a freighter carrying 5,000 sheep capsized at the docks in Kuwait's harbor - to stop the further contamination of Kuwait's drinking water, the ship **had to be raised as quickly as possible**
- Bringing in cranes would have taken too long, and with such methods there is a significant risk that the ship will break
- The Danish inventor Karl Krøyer came up with **a method of raising this sunken ship by filling it with buoyant bodies fed through a tube**
- In December 1964 he filled the ship with 27 million plastic balls made of expandable polystyrene foam and weighing 65 tons - the total cost to save the ship was only $345,000

- Krøyer applied for a patent for his invention
- The Dutch Patent Office found an old issue of the Donald Duck magazine (1949) which showed the same invention
- Since an invention has to be new to be patentable, **the application was refused**
- The Duck story was considered to be **novelty-destroying prior art**

Source: Images from 'The Sunken Yacht', © 1949 Walt Disney Corporation
Krøyers patent (DE1247893B), 1976

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1. What is innovation?

Putting new in perspective

New to the world

New to the market

New to the firm

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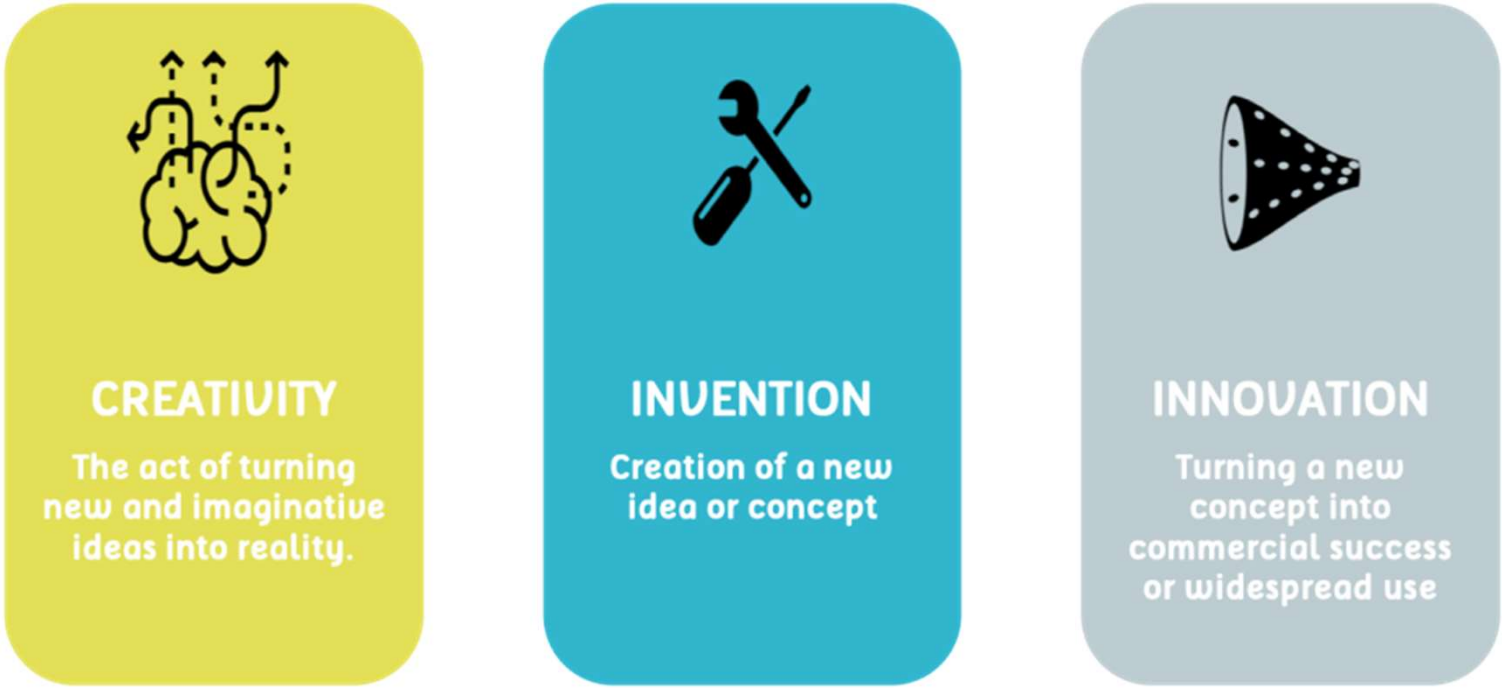
1. What is innovation?



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1. What is innovation?

Comprehensive definition

"Innovation is: production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome." (Crossan & Apadin, 2010, p.1155)*

This definition captures several important aspects of innovation:

- both internally conceived and externally adopted innovation ('production or adoption');
- innovation as more than a creative process, by including application ('exploitation');
- intended benefits ('value-added') at one or more levels of analysis;
- it leaves open the possibility that innovation may refer to relative, as opposed to the absolute, novelty of an innovation;
- attention to the two roles of innovation (a process and an outcome).

*According to Crossan & Apadin (2010): "This definition is an abridged version of the current and up-to-date understanding of the concept of innovation as described in the European Commission's *Green Paper of Innovation* (1995, pp. 1–2). The original modifier 'successful' present in the source was replaced with 'value-added' as it would have prevented us from defining innovation *ex-ante*, before its implementation

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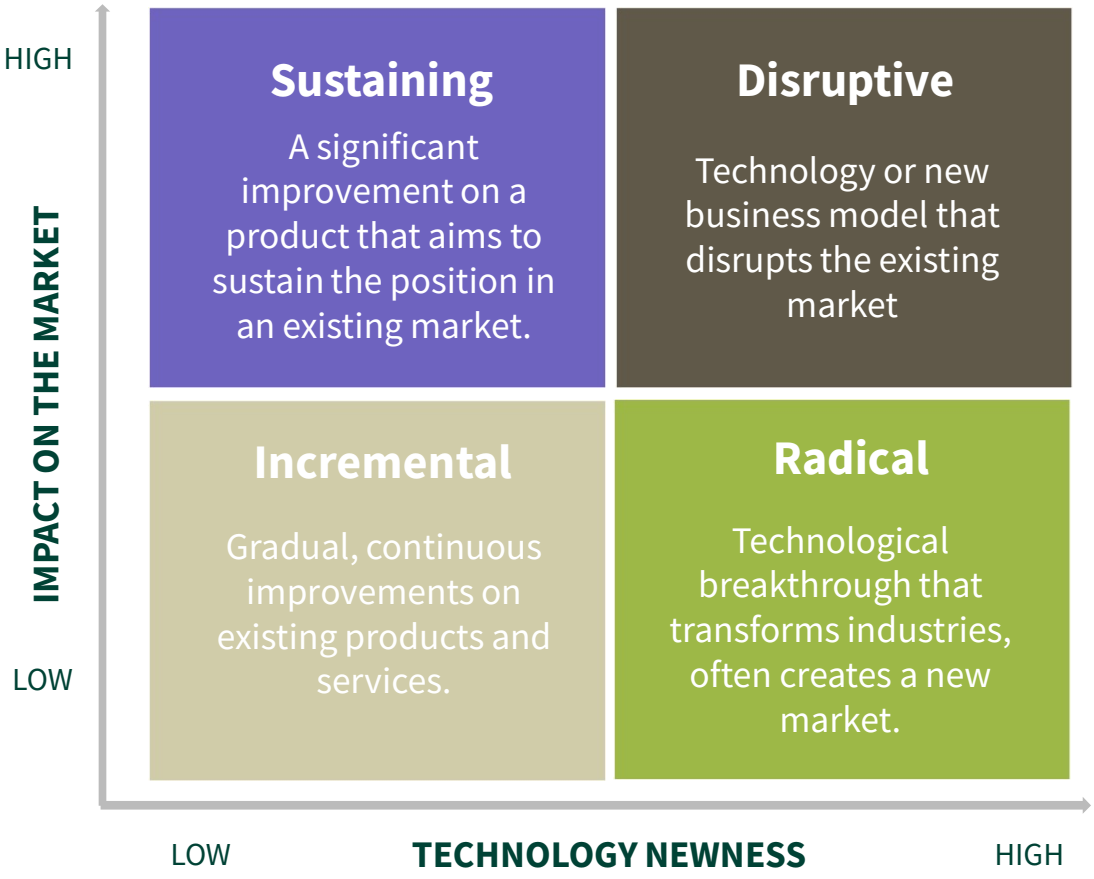
1. What is innovation?



1. What is innovation?

Incremental Innovation

- Most innovations are incremental, gradual and **continuous improvements** in the existing concepts, products or services in the existing market.
- Incremental innovations are **slightly better** than the previous version of the product or service and has only slight variations on an existing product formulation or service delivery method.
- **Products** can be made **smaller, bigger, easier to use or more attractive without changing the core functionality** of it whereas **services** can be made **more convenient, fast, and efficient for the user**, for example.

TV today is a result of continuous incremental improvement.

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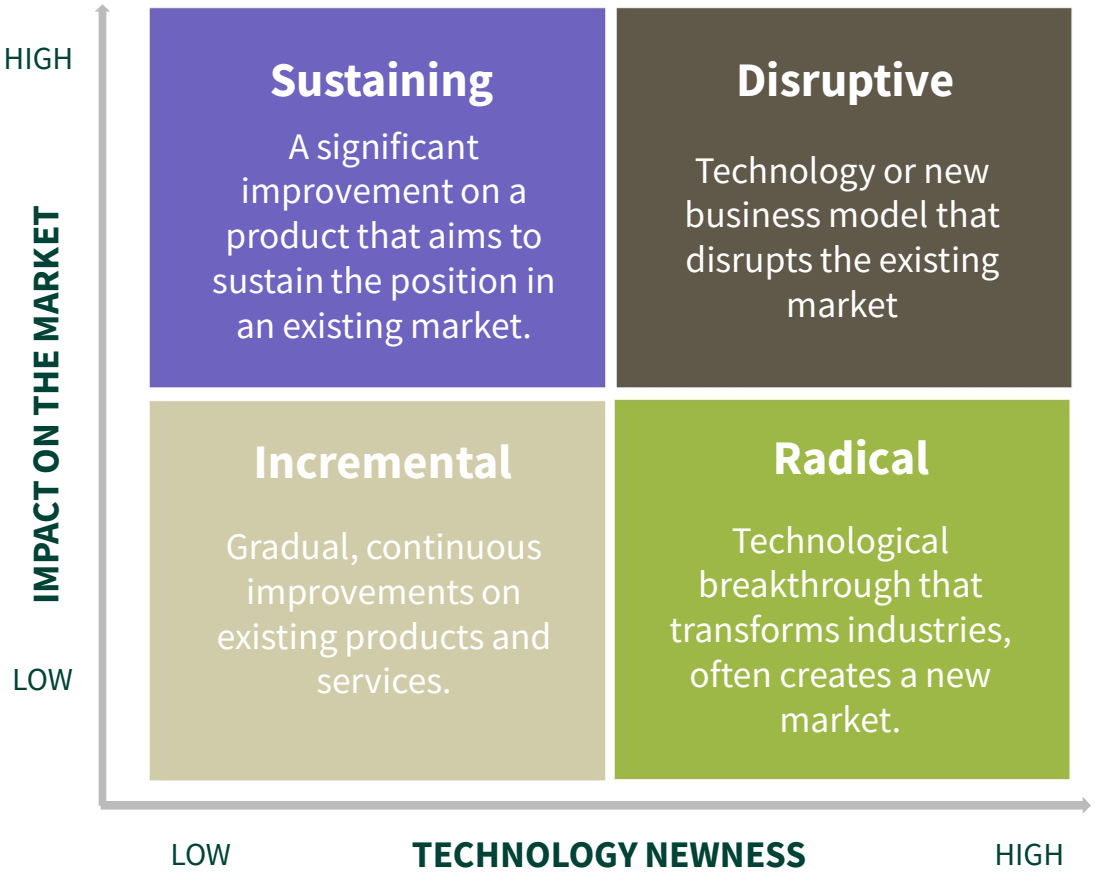
1. What is innovation?



1. What is innovation?

Sustaining Innovation

- Sustaining innovation is similar to incremental innovation in a sense that the product is made slightly better with every iteration, reducing defects.
- The new improved version of the product can be more expensive and have higher margins than the previous one if it targets more demanding, high-end customers with better performance than what was previously available.

New models of the iPhone **sustain the existing business model** in the premium segment of the market to meet the needs of a more demanding customers who are willing to pay more for a newer, slightly better version of the phone.

1st Generation iPhone

iPhone 11 Pro Max

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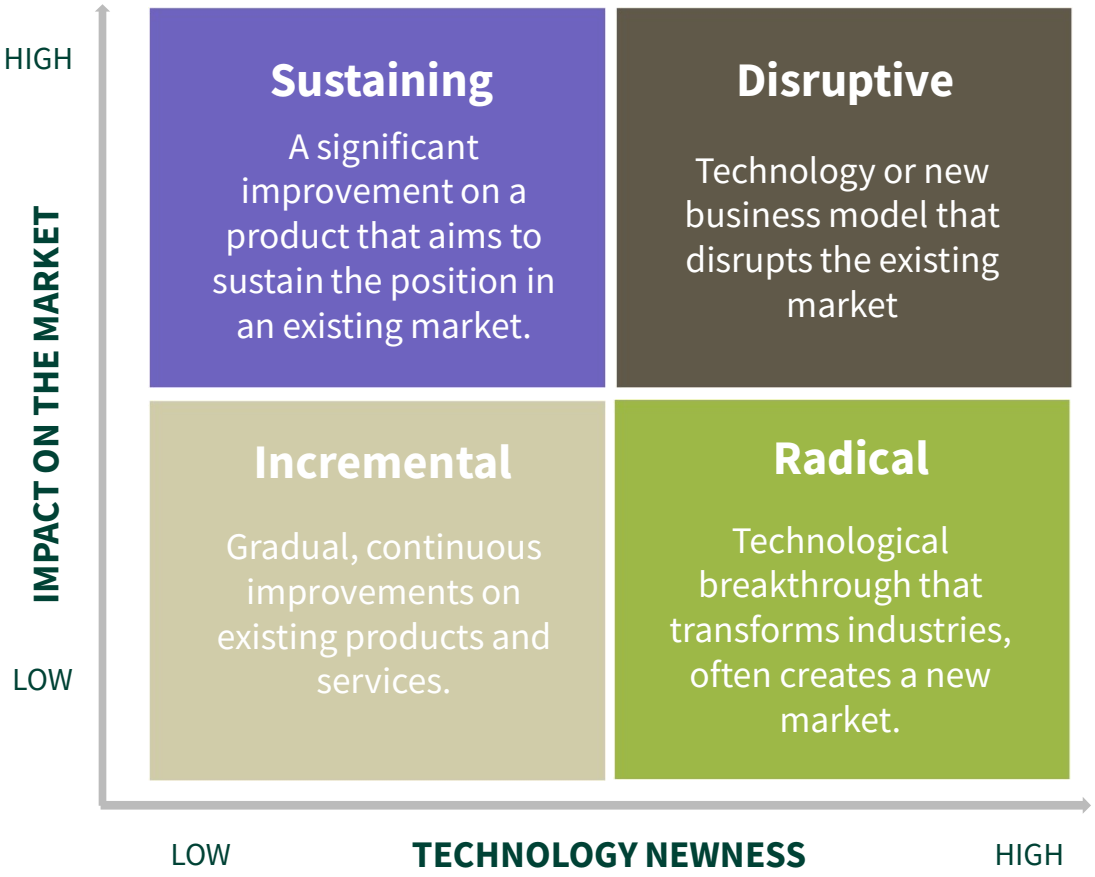
1. What is innovation?



1. What is innovation?

Radical Innovation

- Radical innovation is **rare** as it has similar characteristics to disruptive innovation but is different in a way that it first and foremost **uses revolutionary technology.**
- Radical innovation solves global problems and **addresses needs in completely new ways** than what we're used to and even **provides solutions to needs and problems we didn't know we had**, completely transforming the market, or even the entire economy.
- Because radical innovation is so different from what people are used to, it does usually **face significant resistance at first**.

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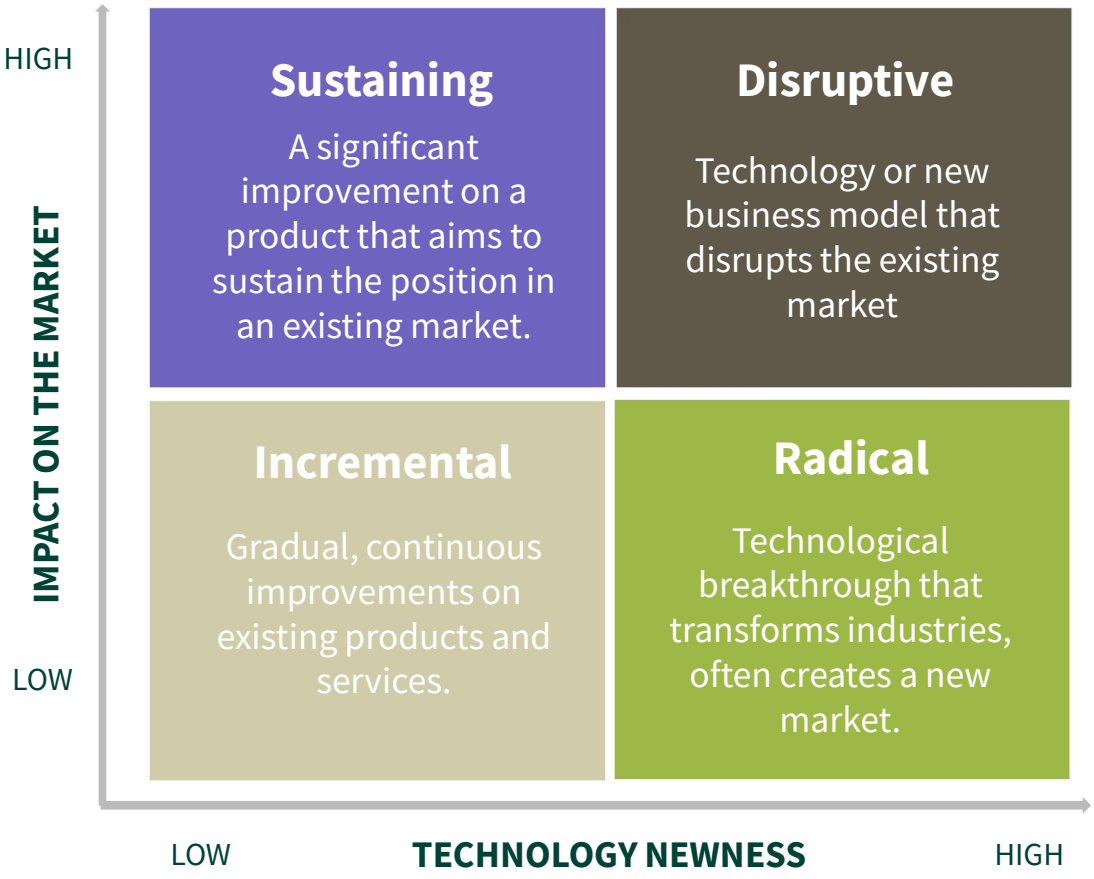
1. What is innovation?



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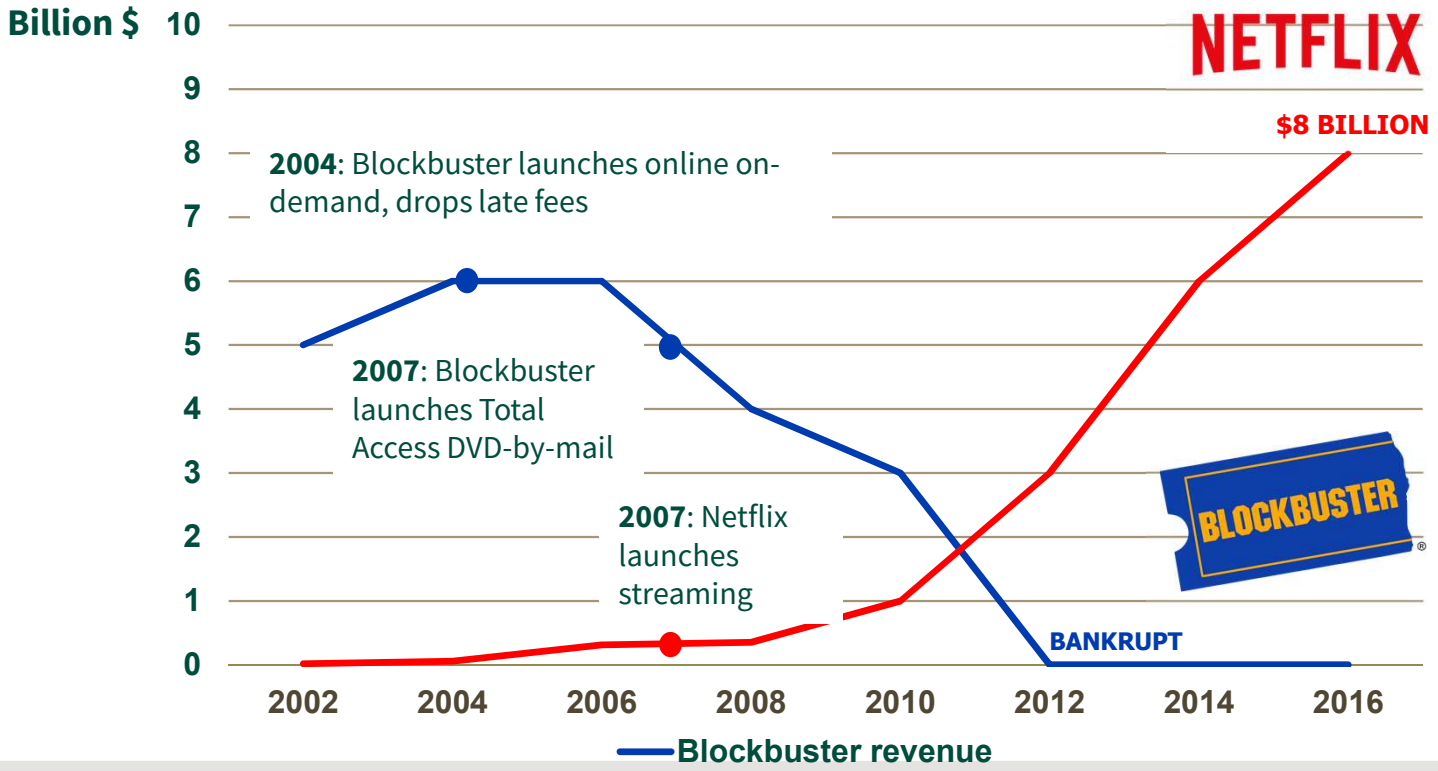
1. What is innovation?

Disruptive innovation: Netflix vs. Blockbuster

Netflix is a classic example of a disruptive innovation that uses new **technology** and a new **business model** in an existing market, eventually disrupting Blockbuster.



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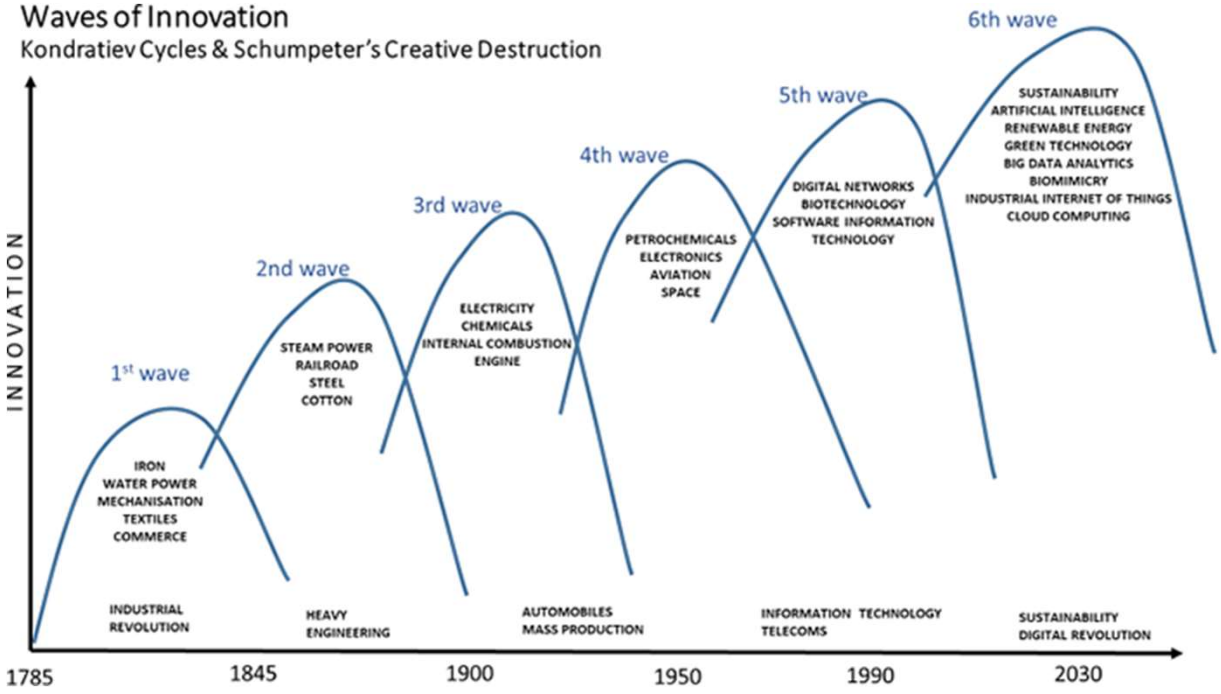
2. Innovation: Origin Story
Joseph Schumpeter: Father of innovation

- Joseph Schumpeter as the father of innovation studies (Freeman 2003) presented a framework to explain how modern economies emerged during the Industrial Revolution in the 1920s

- Schumpeter argued that the industrial revolution was shaped by **successive waves of radical innovations**, starting with major advances in textile machinery and followed by the steam engine, which spurred waves of industrial investments, first in England and then in continental Europe and North America around the beginning of the 19th century.



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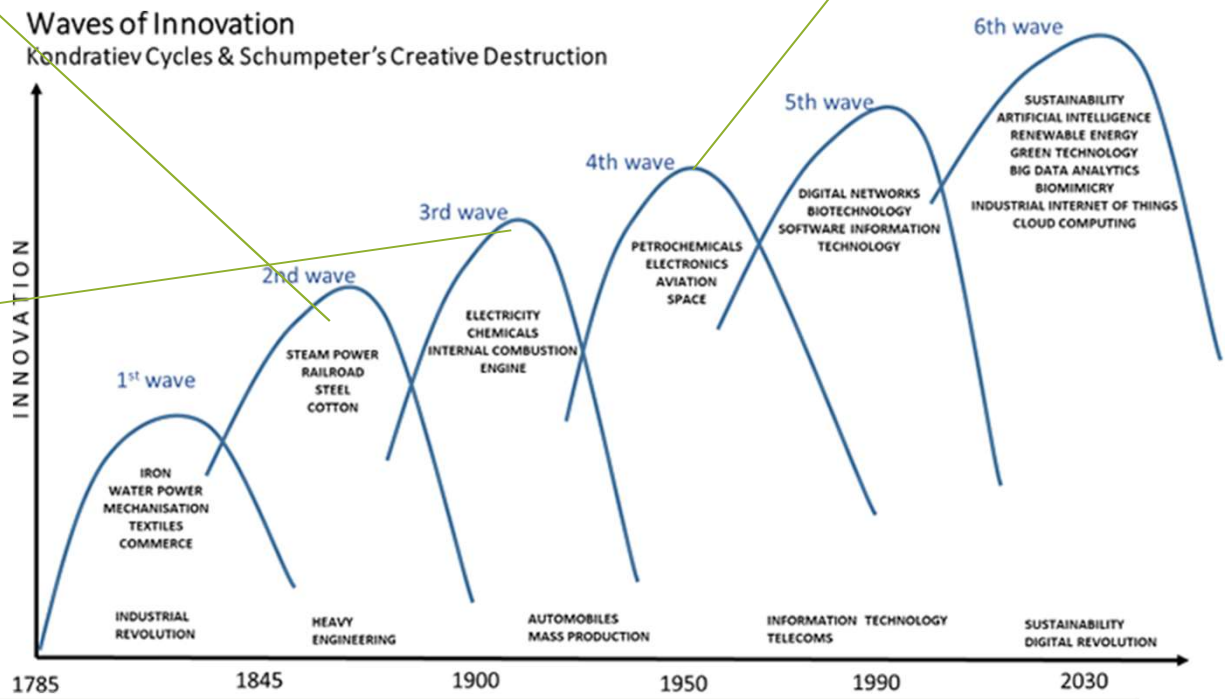
2. Innovation: Origin Story
Schumpeter: Waves of innovation

Inventions in steel-making then led to the construction of railroads and steel ships, easing long-distance transportation of merchandise and spreading the Industrial Revolution to secondary cities.

At the beginning of the 20th century, the automobile industry became an economic driver, after Henry Ford revolutionized the assembly line in 1910.

Building on discoveries in chemistry and electricity, entrepreneurs then developed the chemical, petrochemical, and power industries.



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2. Innovation: Origin Story
Schumpeter I view of innovation (early work)

- Beyond technological long waves, he emphasized **the central role of entrepreneurs in this process**, and showed how entrepreneurs **combine emerging know-how and technologies** to deliver superior benefits to the marketplace.
- Any **innovation disturbs the economic status quo** and supports the cycle of economic growth. The most radical innovations spur complete new cycles.
- Schumpeter coined the phrase **'creative destruction'** to describe the impact of these radical innovations.
- Irony: innovation is both the birth of something new, and risking the death of something old.
- This entrepreneur-led model of economic growth can be called the **Schumpeter I view of innovation**.

Henry Ford & Thomas Edison

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2. Innovation: Origin Story
Schumpeter II: Later work

- Later in his life, Schumpeter and his work was profoundly affected by The Great Depression, leading him to **abandon the optimism** that informed his earlier work.
- His view on innovation evolved, contradicting some of his earlier views, particularly on the **role of entrepreneurs**. Schumpeter argued that **innovation now occurred primarily within large corporations** controlled by its senior management .
- They had to **dominate the innovation process** to maintain their dominance in the marketplace and to ensure their profitability and survival.
- **Only these large firms had the financial resources** to identify market opportunities and invest in R&D on the scale required to capitalize on technological discoveries. Only they had the capacities to transform these innovations into products and processes suitable for mass consumption.
- **Innovation had become the privileged domain of large corporations**. Against these Leviathans, small entrepreneurs had little chance of success.
- **This was Schumpeter II, and it would dominate economic thinking for the next 50 years.** Schumpeter's new view on innovation was linear describing the journey from the laboratory to the marketplace.

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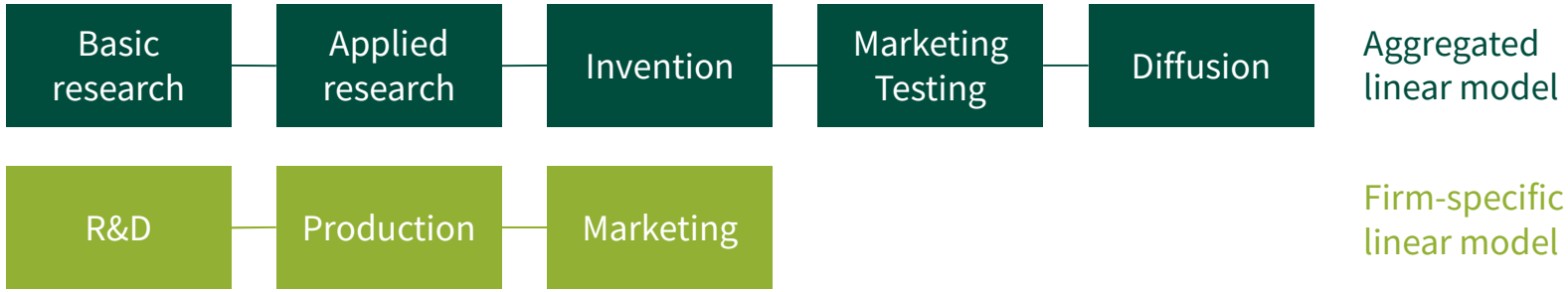
2. Innovation: Origin Story
Linear model of innovation

- Schumpeter II provided the **intellectual foundations** for post–World War II government policies in North America and Europe that emphasized significant public investment in research conducted in large government laboratories, and whose results could be transmitted to large corporations, which with further R&D would transform those results into commercial products.
- Around the same time, economists started to highlight the **important contribution of technological progress to economic growth**. Advances in mathematical and econometric modeling in the post-war years led to the development of a field of research known as **growth economics**.
- Robert Solow in 1956 published a landmark paper in which he suggested that **'technical progress'** was as important to economic growth as increases in capital and labor.
- In this linear model of innovation that prevailed among economists and policy makers, basic research leads to applied research, then to product development supported by market research and, finally, to commercialization of new products and new processes.



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2. Innovation: Origin Story
Schumpeter II: Route 128

- **Route 128 around Boston** became the symbol of the mastery of the **process of innovation described by the Schumpeter II model**: the numerous government and corporate laboratories that proliferated in the Boston area generated discoveries on which the large number of high-technology firms that sprang up along Route 128 capitalized.
- But Route 128's triumph was not to last. Of the six companies mentioned, not one remained in operation by 1990.
- Like these companies that once exemplified the model, Schumpeter II was to lose its credibility as a model for innovation.

apollo WANG digital

Lotus software

Data General

VISICALC™

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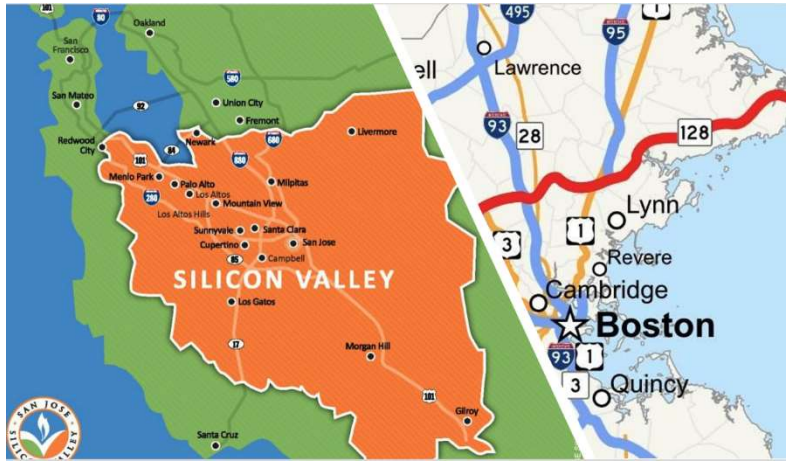
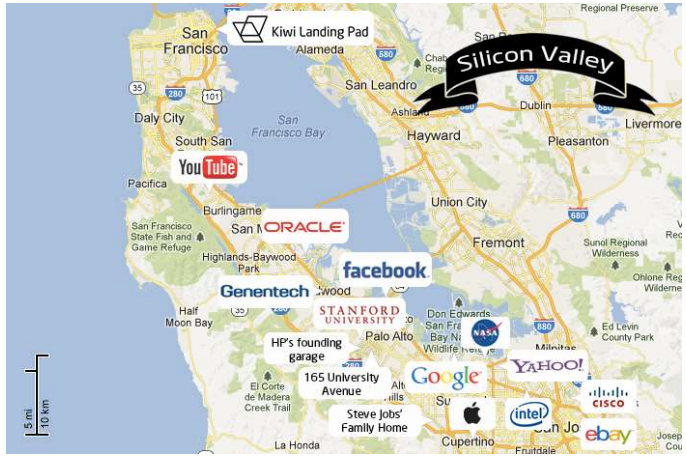
2. Innovation: Origin Story Schumpeter I in Silicon Valley

- About 15 years after Route 128, an alternative model emerged in Silicon Valley: a constant flow of entrepreneurs moving into the San Francisco Bay area began developing a vast array of commercial applications for rapidly developing ICTs.
- Like Boston, San Francisco was a center of scientific discovery. But on the West Coast, opportunities were identified not by large corporations but by entrepreneurs and their venture-capitalist backers.
- Lean and nimble, these used their first-mover advantage to build a new generation of businesses, **very much along the lines of the entrepreneur-based view of Schumpeter I.**





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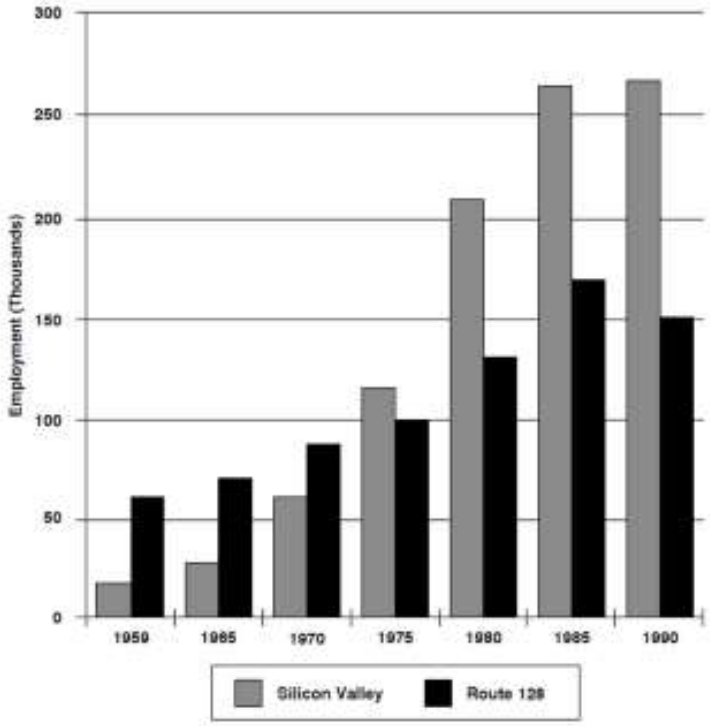
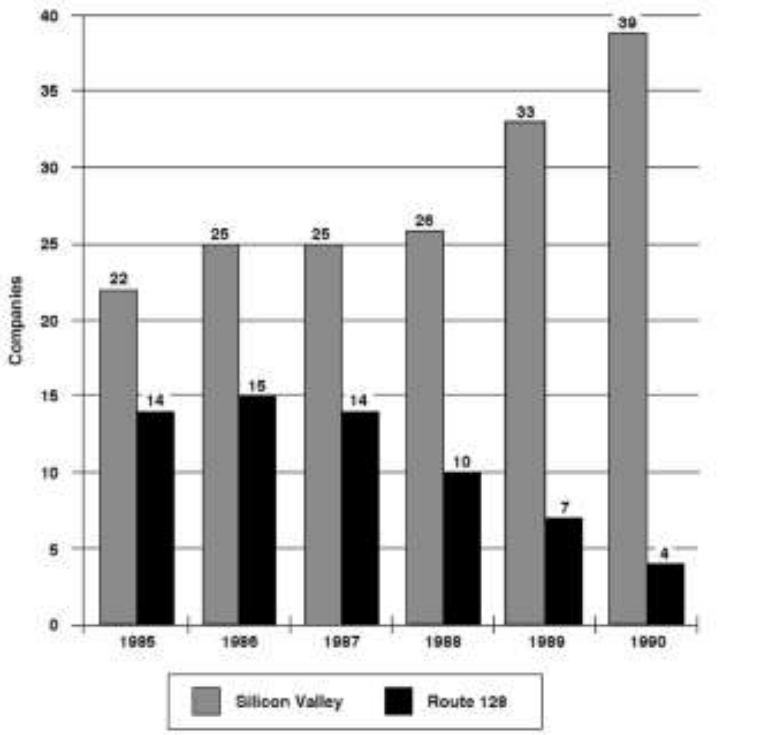
2. Innovation: Origin Story
Brain drain from Route 128 to Silicon Valley

Total High Technology Employment, Silicon Valley and Route 128, 1959 to 1990



Fastest Growing Electronics Firms, Silicon Valley and Route 128, 1985 to 1990



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2. Innovation: Origin Story
Different school of thought in innovation research

- Innovation schools of thought or research traditions*: “a network of interlinked concepts that together provide a comprehensive understanding of a phenomenon” (Jabareen 2009: 51)

linear and planned	iterative and interactive	practice-based
• American community of engineering and business management established in the 1980s • the firm operates as stand-alone actor • intentional and goal-directed nature of research — prediction and control • Reality: stable over time and predictable	• To a large part European service school community, which originated from the linear and planned school • but frames innovation according to a more open, relational, and systemic approach • user-centered and relational conceptualization of innovation • Reality: complex, often unstable, and only partially known and predictable	• embraces a large and heterogeneous community of researchers • defines innovation as the understanding of dimensions of social and collective doings: construction of human activity, learning, and practices • Reality: the result of social construction; no universal solutions to innovation problems and no ready answers but thoughtful guidelines and insights

*this classification taken from Mele et al (2017) is partial and does not fully take into account rich literature on innovation in business studies

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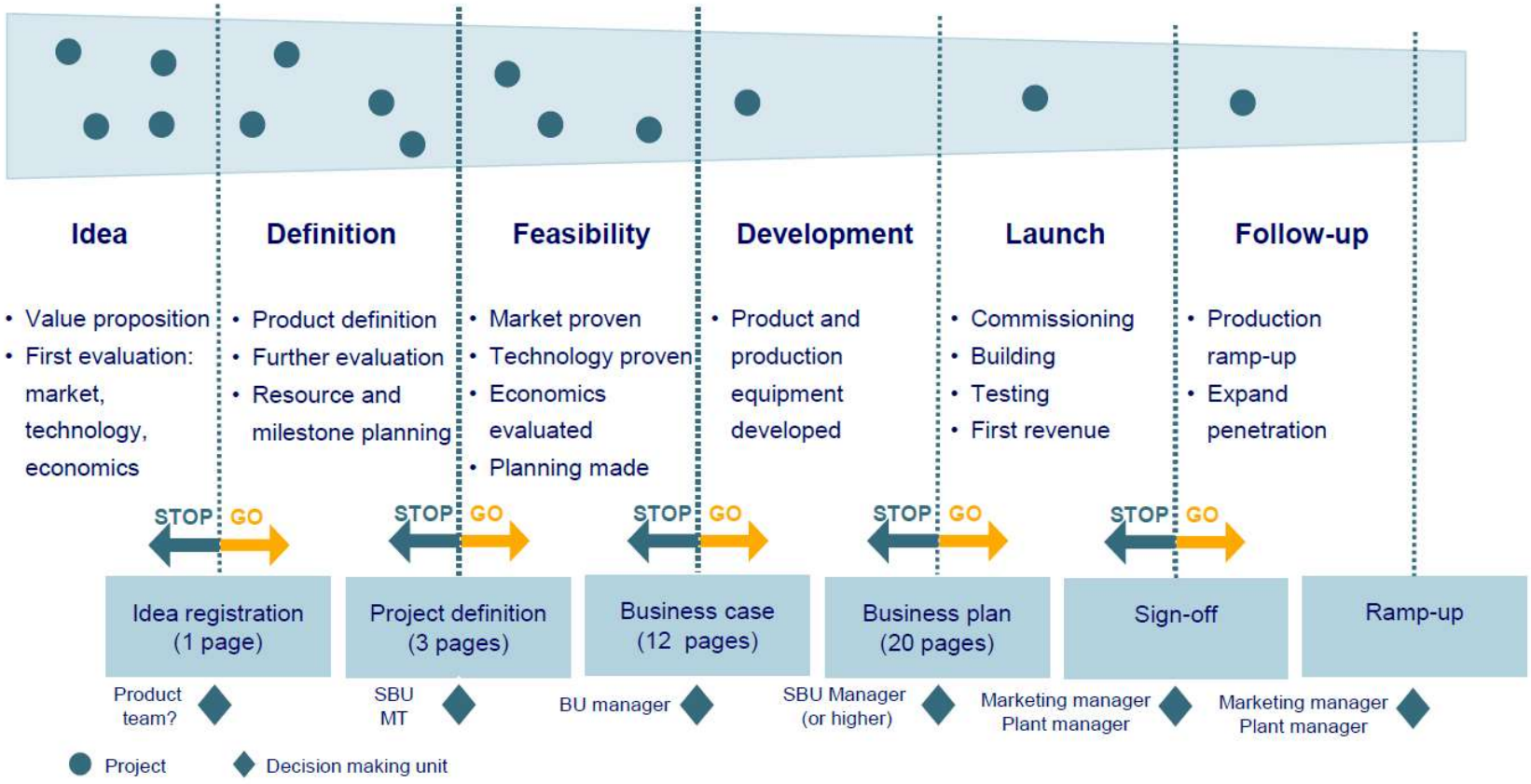
2. Innovation: Origin Story
Innovation process in linear & planned school of thought



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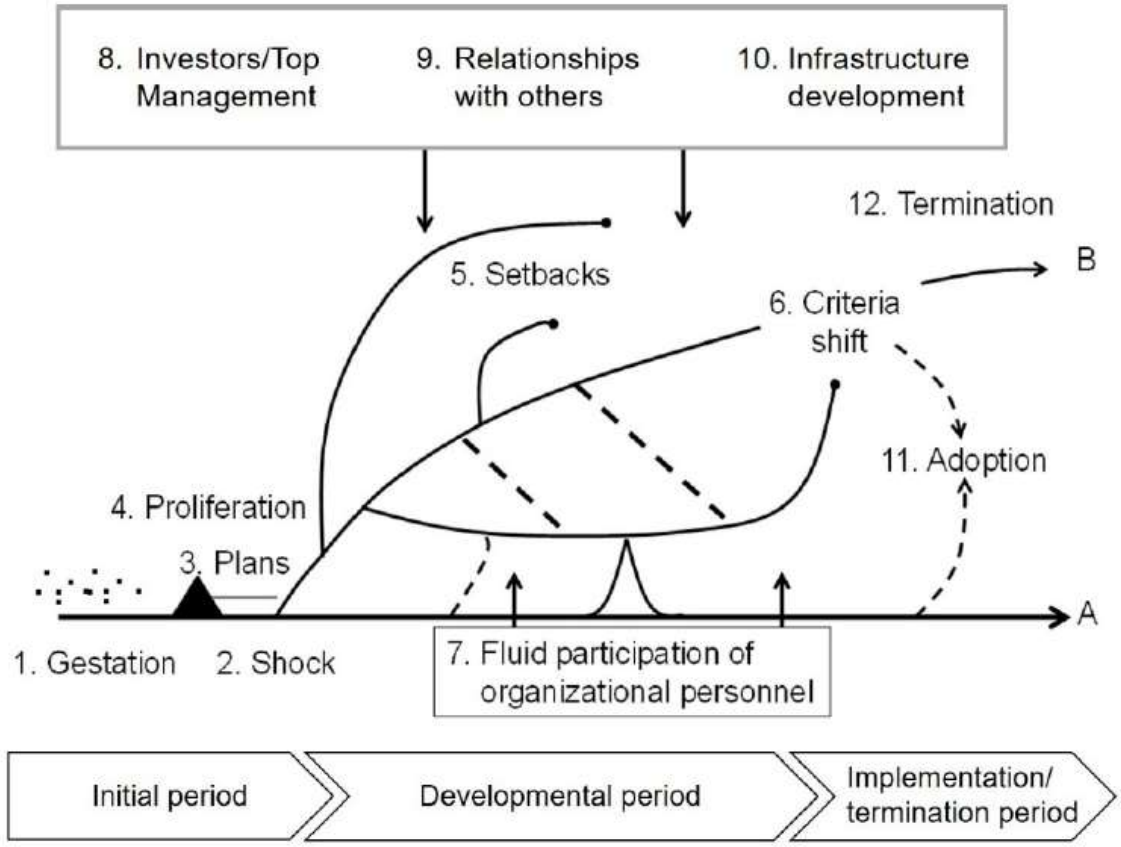
2. Innovation: Origin Story
Innovation process in iterative & interactive school of thought



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3. Genesis of innovation theories

From Schumpeter to a field of research

- Joseph SCHUMPETER (1911) Theorie der wirtschaftlichen Entwicklung // (1934) Theory of economic development:

Context of Innovation: Economic model of circular flow

- Circular flow describes a stationary situation of equilibrium and perfect competition. → Applied to contrast and explain economic development after a change in organizational routines takes place through innovation.
- In change-over from “routine economic growth” to “dynamic economic development”, Schumpeter introduced the notion of “new combinations”

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3. Genesis of innovation theories

From Schumpeter to a field of research

- Joseph SCHUMPETER (1911) Theorie der wirtschaftlichen Entwicklung // (1934) Theory of economic development.

Innovation as "new combinations" (Schumpeter 1934, p. 66)

- New product or new quality of a product
- New method of production
- New market
- New source of supply of raw materials or half-manufactured goods
- New organization of any industry

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3. Genesis of innovation theories

From Schumpeter to a field of research

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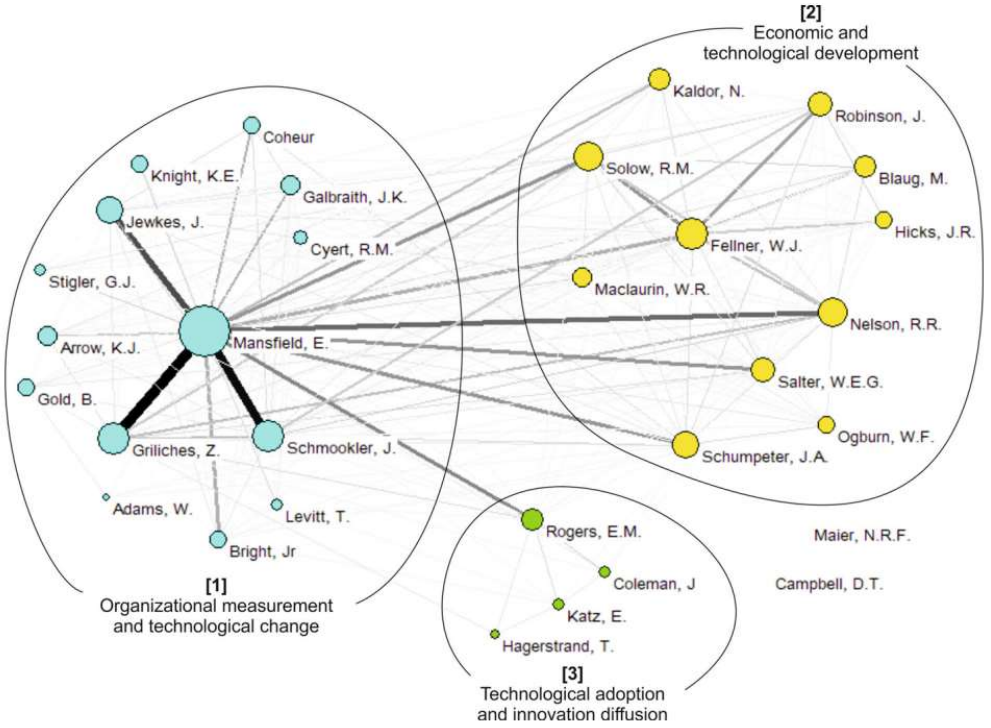
3. Genesis of innovation theories

From Schumpeter

to a field of research

(co-citation networks 1956-1970)



(Rosetto et al. 2018, p.1347)

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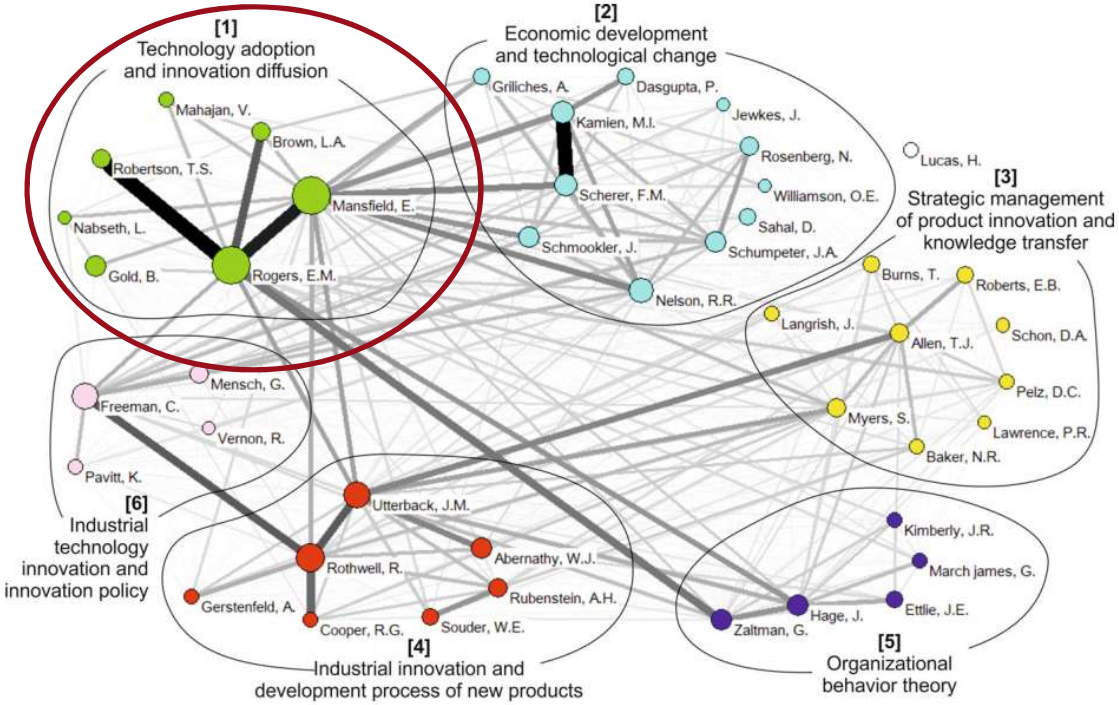
3. Genesis of innovation theories

From Schumpeter

to a field of research

(co-citation networks 1971-1985)



(Rosetto et al. 2018, p.1348)

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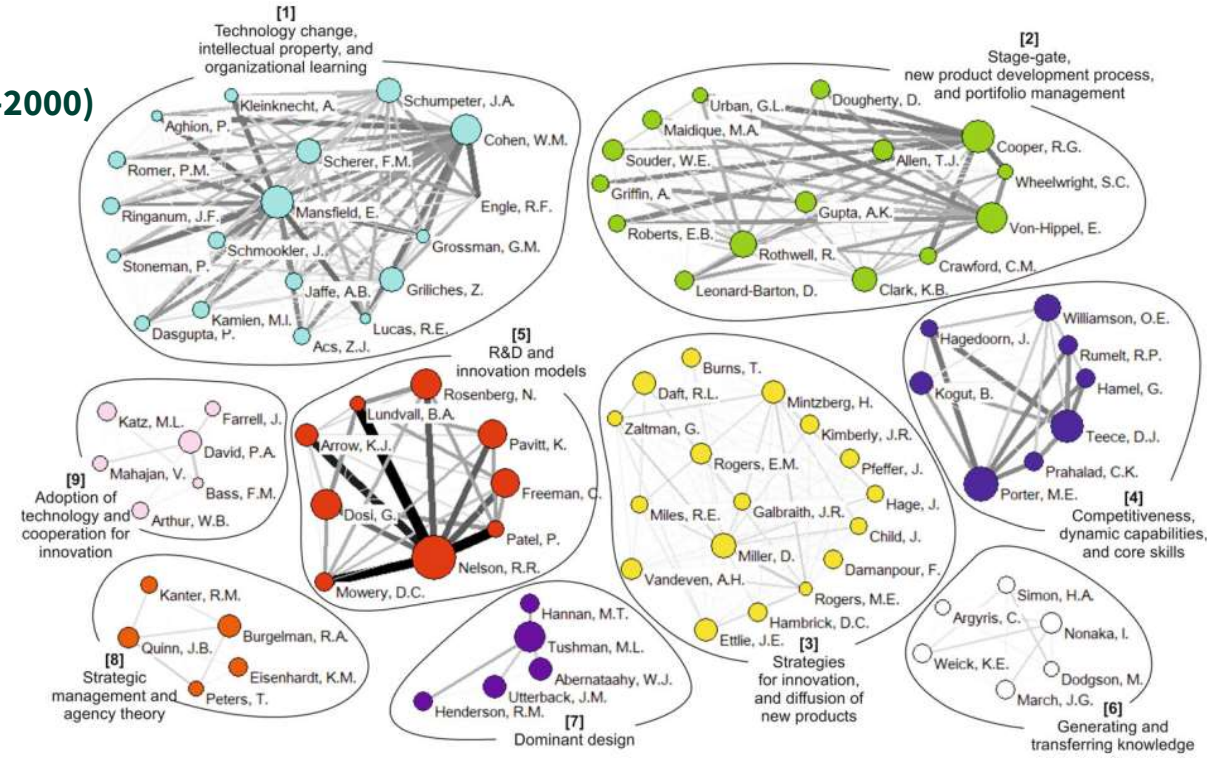
3. Genesis of innovation theories

From Schumpeter

to a field of research

(co-citation networks 1986-2000)



(Rosetto et al. 2018, p.1348)

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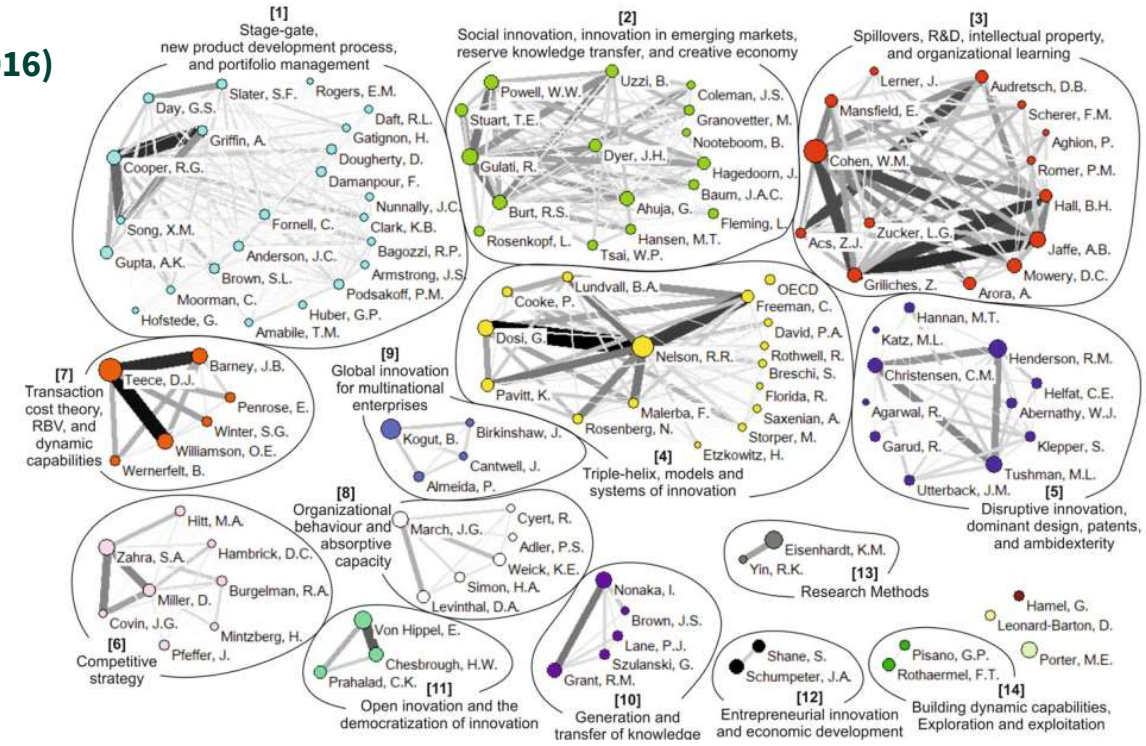
3. Genesis of innovation theories

From Schumpeter

to a field of research

(co-citation networks 2001-2016)



(Rosetto et al. 2018, p.1348)

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3. Genesis of innovation theories

From Schumpeter

to a field of research

(Ranking of Top 20 papers most cited at 4th period)

4th period [2001–2016]			
Rank	Paper's author (year)	Cit.	CV (%)
1	Venkatesh et al. (2003)	3.424	0.75
2	Zahra and George (2002)	1.768	0.39
3	Dimasi et al. (2003)	1.571	0.34
4	Zollo and Winter (2002)	1.324	0.29
5	M. E. Porter and Kramer (2006)	935	0.20
6	Boschma (2005)	910	0.20
7	Tsai (2001)	903	0.20
8	Laursen and Salter (2006)	864	0.19
9	Reagans and McEvily (2003)	794	0.17
10	Amit and Zott (2001)	737	0.16

(Rosetto et al. 2018, p.1343)

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3. Genesis of innovation theories

Economy
(Schumpeter, 1934)
(Mansfield, 1963)
(C. Freeman, 1974)
(Nelson and Winter, 1982; OECD, 1981)
(Nelson and Winter, 1982)
(Dosi, 1990)
(Baumol, 2002)
(Chen *et al.*, 2004)
(Roper and Love, 2004)

Innovation and entrepreneurship
(Barnett, 1953)
(Drucker, 1985)
(Kuhn, 1985)
(Urabe and Child, 1988)
(Lundvall, 1992)
(Cumming, 1998)
(Salavou, 2004)
(Alves *et al.*, 2005)
(John Bessant and Tidd, 2007)
Management
(Swan *et al.*, 1999)
(Cardinal *et al.*, 2001)
(Plessis, 2007)

Business and management
(Karger and Murdick, 1966)
(Knight, 1967)
(Caroll, 1967)
(Becker and Whisler, 1967)
(Shepard, 1967)
(Daft, 1978)
(Van de Ven, 1986)
(Tushman and Nadler, 1986)
(Lewis and Seibold, 1993)
(Wolfe, 1994)
(Brown, 1994)
(Damanpour, 1996)
(Klein and Sorra, 1996)
(McGrath *et al.*, 1996)
(Mone *et al.*, 1998)
(Trott, 2005)
(J. Freeman and Engel, 2007)
(Damanpour, 1996)

Marketing
(Porter, 1990)
(Berthon *et al.*, 2004)

Technology, science and engineering
(Myers and Marquis, 1969)
(Roy Rothwell and Gardiner, 1985)
(During, 1986)
(Nord and Tucker, 1987)
(Badawy, 1988)
(Damanpour and Gopalakrishnan, 1998)
(Udwadia, 1990)
(Sundbo, 1996)
(Dunphy *et al.*, 1996)
(Tang, 1998)
(Figueroa and Conceicao, 2000)
(Smits, 2002)
(Francis and Bessant, 2005)

Organization study
(Barnett, 1953)
(Thompson, 1965)
(Zaltman *et al.*, 1973)
(Kimberly, 1981}
(M.A. West and Farr, 1991)
(García-Morales *et al.*, 2008)

Baregheh et al. (2009) Towards a multidisciplinary definition of innovation; sources of innovation definitions

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3. Genesis of innovation theories

	Business and management	Economy	Innovation and entrepreneurship	Technology/science/ engineering	Knowledge management	Marketing	Organization study
Nature	New, 16 Change, 4	New, 24 Improved, 4	New, 10 Change, 2	New, 11 Challenge, 2 Change, 2	New, 2 Improve, 1	New, 3 Change, 2 Improve, 1	New, 4
Type	Product, 7 Process, 5 Service, 5 Program, 2	Product, 9 Process, 6 Service, 3 Technical, 3	Product, 4 Service, 4 Technical, 3	Product, 10 Service, 8 Process, 7 Technical, 3	Product, 2 Incremental, 1 Process, 1 Radical, 1 Service, 1 Technical, 1	Product, 2 Process, 1 Service, 1	Product, 4 Process, 3 Service, 3
Stages	Adoption, 3 Creation, 4 Design, 2 Implementation, 2 Development, 2	Production, 4 Introduction, 3 Manufacturing, 3 Development, 2 Commercialization, 3	Generation, 3 Application, 2 evelopment, 2 Implementation, 2 Acceptance, 1 Creation, 1	Adoption, 7 Development, 3 Generation, 7 Implementation, 2 ntroduction, 2 Commercialization, 4 Creation, 2	Creation, 2 Decision, 1 Design, 1 Development, 1	Learning, 1 Communication, 1	Adoption, 3 Application, 2 Development, 2 Program, 2
Environment	Organization, 7 Firm, 6 Customer, 2 Developer, 2 External, 2 System, 2 Users, 2	Organization, 2 Actor, 1 Consumer, 1 Customer, 1 Social system, 1	Organization, 2 Users, 2 Customers, 1 Employee, 2	Organization, 12	Group, 1 Internal, 1 Organization, 1	Organization, 1	Firm, 5 Organization, 4 Group, 2 Unit, 2
Means	Idea, 5 Resource, 4 Invention, 3 Technology, 3 Investment, 2 Market, 2 Creativity, 1	Economy, 2 Equipment, 2 Idea, 2 Industry, 2 Market, 2 Technology, 2	Idea, 5 Creativity, 5 Invention, 2 Innovativeness, 1	Market, 6 Technology, 6 Creativity, 4 Invention, 4 Idea, 2 Innovativeness, 1	Knowledge, 2 Idea, 1 Market, 1	Technology, 1 Invention, 1	Idea, 3 Innovativeness, 3
Aims	Superior, 4 Advantage, 2 Value, 2 Competition, 2 Influence, 2 Sustain, 2 Differentiation, 2	Economic, 2 Compete, 3	Economy, 2 Need, 2 Compete, 2 Success, 2	Economic, 2 Success, 2 Differentiation, 1	Business, 1	Superior, 1	

Baregheh et al. (2009) Towards a multidisciplinary definition of innovation; sources of innovation definitions

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3. Genesis of innovation theories

Attributes of the basic concept of innovation

- **Nature of innovation** refers to the form of innovation as in something new or improved.
- **Type of innovation** refers to the kind of innovation as in the type of output or the result of innovation, e.g. product or service.
- **Stages of innovation** refers to all the steps taken during an innovation process which usually start from idea generation and end with commercialization.
- **Social context** refers to any social entity, system or group of people involved in the innovation process or environmental factors affecting it.
- **Means of innovation** refers to the necessary resources (e.g. technical, creative, financial) that need to be in place for innovation.
- **Aim of innovation** is the overall result that the organizations want to achieve through innovation.

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